

CLAIMS

1. A soap comprising:
phosphate salt; and
fatty acid salts, in combination.
- 5 2. The soap of claim 1 wherein the phosphate salt is selected from the group of cations consisting of:
hydrogen;
ammonium;
lithium;
10 potassium; and
sodium;
and the group of anions consisting of:
phosphate;
pyrophosphate; and
15 polyphosphate.
3. The soap of claim 1 wherein the fatty acid salt is selected from the group of anions consisting of:
any fatty acid having carbons in the range of 6 to 36;
any aromatic acid having carbons in the range of 6 to 36;
20 branched chain fatty acid;
straight chain fatty acid;

unsaturated fatty acid;
polyunsaturated fatty acid; and
aromatic acid;
and the group of cations consisting of:

5 potassium;
 lithium;
 sodium;
 ammonium; and
 amine.

10 4. The soap of claim 1 fortified by the addition of an alkaline metal salt that has a pH
 greater than 7.

5. A process for treating water comprising:
 mixing a phosphate fatty acid salt mixture with the water;
 mixing a polyvalent metal precipitation agent with the water mixture;

15 adjusting the pH of the mixture to be in the range of 4 to 9; and
 separating purified water from the resulting precipitant.

6. The process of claim 5 wherein the precipitation agent is calcium chloride and the pH
 is adjusted within a pH range of 6 to 9.

7. The process of claim 5 wherein the precipitation agent is selected from the group of
20 anions consisting of:

 polyvalent metal ion;
 calcium;
 magnesium;

aluminum; and

iron.

8. The process of claim 5 wherein the additional step of adding flocking agents to the mixture before separating the purified water from the precipitant.

5 9. The process of claim 5 wherein the step of adjusting the pH comprises adding acids, bases or salts.

10. A washing and water treatment process comprising the steps of:

washing articles with soap comprising phosphate salt and fatty acid salts, in combination and water;

10 and then, treating the resulting soap/water mixture by a process comprising:
mixing a polyvalent metal ion precipitation agent with the soap/water mixture;
adjusting the pH of the mixture to be in the range of 4 to 9; and
separating purified water from the resulting precipitant.